The Tentative Discharge Requirements Are Unlawfully Inconsistent With The Bay Delta Plan And Basin Plan

The Tentative Discharge Requirements are not consistent with the Bay Delta Plan, or the Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins ("Bay Delta Plan"). Most obvious, the Tentative Discharge Requirements impose an electrical conductivity (EC) limitation of 1,300 µmhos/cm (annual average), (Tentative Discharge Requirements, IV.A.1.j), while the Bay Delta Plan and the Basin Plan impose much more stringent requirements. The Bay Delta Plan and the Basin Plan establish 30-day running average salinity objectives of 700 µmhos/cm from April through August, and 1,000 µmhos/cm from September through March: (1) in the San Joaquin River at Brandt Bridge, (2) in Old River near Middle River, and (3) in Old River at Tracy Road Bridge. Thus, because of the differing periods of measurement, the EC limitation, at a minimum, exceeds the salinity objectives established in the Bay Delta Plan and the Basin Plan by approximately 30 to 85 percent.

To support EC limitations that are contrary to the Bay Delta Plan and the Basin Plan, the Tentative Discharge Requirements cite to Water Quality Order 2005-005. The Tentative Discharge Requirements suggest that, in Water Quality Order 2005-005, the SWRCB intended for "permit limitations to play a limited role with respect to achieving compliance with the EC water quality objectives." (Tentative Discharge Requirements, Attachment F, IV.C.3.y.v.) The Tentative Discharge Requirements also suggest that EC limitations consistent with the salinity objectives in the Bay Delta Plan and Basin Plans are infeasible. (*Id.*) The rationales fail for at least two reasons.

An interpretation that effluent limitations have a circumscribed role in achieving salinity water quality objectives is belied by the Bay Delta Plan. In the Bay Delta Plan, which the SWRCB adopted after it issued Water Quality Order 2005-005, the SWRCB made clear that the Central Valley Regional Board maintains a role in implementing salinity water quality objectives. The most explicit example is the SWRCB order to the Central Valley Regional Board, that requires it to "impose discharge controls on in-Delta discharges of salts by agricultural, domestic, and municipal dischargers", as a means of implementing salinity objectives in the San Joaquin River at Brandt Bridge, in Old River near Middle River, and in Old River at Tracy Road Bridge. (Bay Delta Plan at Ch. IV, B.1.) Contrary to that order, but as conceded in the Tentative Discharge Requirements, the proposed EC limitations "may cause or contribute to an exceedance of a water

quality objective for salinity." (Tentative Discharge Requirements, Attachment F, IV.C.3.y.v.)

Furthermore, an argument that it is infeasible for the City to implement measure that will allow it to comply with the existing water quality objectives established in the Bay Delta Plan and Basin Plan is not well taken. Those objectives are not new. They date back to at least 1995, when the SWRCB issued is 1995 Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary. Ample time has passed for dischargers like the City to develop means of complying with the salinity objective set forth in the Bay Delta Plan and Basin Plan.

The Tentative Discharge Requirements do include a circumstance when the City must comply with the salinity objectives established in the Bay Delta Plan and the Basin Plan. However, the circumstance occurs only when the City fails to comply with a salinity reduction plan mandated in the Tentative Discharge Requirements. In other words, the Tentative Discharge Requirements impose on the City obligations that are consistent with the Bay Delta Plan and Basin Plan only as a penalty that may not ever be imposed. While the development and implementation of a plan may be appropriate in certain circumstances, this does not appear to be one of those circumstances. As discussed immediately above, the City has or should have been aware of the water quality objectives established for salinity for 13 or more years (the Bay Delta Plan superseded a prior plan adopted by the SWRCB in 1995, which included the same objectives for salinity), and the City has reasonable means to ensure its dischargers meet the objectives established in the Bay Delta Plan and Basin Plan.

The Carryover Of Effluent Limitations From The City's Prior Permit Fails To Consider Changed Circumstances

As discussed above, the Central Valley Regional Board should not simply incorporate into the renewal NPDES permit the existing effluent limitations. The best available scientific data may not support a finding that past limitations are currently protective of beneficial uses. A change may also be warranted because of the City's ongoing violations of its prior NPDES permit.

Two examples of where the existing discharge requirements may not be appropriate are the effluent limitations for ammonia and dissolved oxygen. The effluent limitations for ammonia and dissolved oxygen in the Tentative Discharge Requirements

are essentially carryover effluent limitations from the City's prior NPDES permit for the RWCF.[2] The rationales provided in the Tentative Discharge Requirements for the carryover of the ammonia and dissolved oxygen are presented in a summary fashion. The Tentative Discharge Requirements conclude that the ammonia limitation in the prior permit sufficiently protected the beneficial uses of the waters receiving the City's discharges based on an analysis of the maximum and average concentrations of ammonia in effluent and receiving water. (Tentative Discharge Requirements, Attachment F, IV.C.3.f.)

The Tentative Discharge Requirements for dissolved oxygen provide a similarly cursory explanation. They state:

> The previous permit, Order No. R5-2002-0083, contained effluent limitations for dissolved oxygen of 6.0 mg/L from 1 September through 30 November and 5.0 mg/L throughout the remainder of the year.
>
> The minimum DO concentration observed was 1.8 mg/L based on 1,498 samples collected between 1 May 2002 through 31 January 2007. The discharge demonstrates reasonable potential to exceed water quality objectives contained in the Basin Plan. Therefore, the daily minimum effluent limitations for dissolved oxygen contained in the previous permit, Order No. R5-2002-0083, are retained in this Order

(Tentative Discharge Requirements, Attachment F, IV.C.3.p.) The conclusions and analyses, however, do not consider important, emerging scientific research or the recognized, ongoing violations by the City of its prior NPDES permit.

[2] Actually, the Tentative Discharge Requirements allows an additional one pound of ammonia discharge as both an average monthly and maximum daily figure as compared with the City's prior permit, which could be construed as an unauthorized relaxation of the permit's requirements.

The SWRCB and the Central Valley Board have identified the emergence of potentially important, new science related to toxics, including ammonia, in the Strategic Workplan for Activities in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("Bay Delta Strategic Workplan"), a copy of which is attached hereto as Exhibit D. For example, in that Workplan, the SWRCB and the Central Valley Regional Board wrote:

> Studies suggest that delta smelt may be particularly sensitive to ammonia and that ammonia may limit primary productivity in the Delta. Definitive, controlled laboratory experiments must be conducted to determine the importance of these potential impacts.

(*Id.* at 53.) Also, the Central Valley Regional Board's concern with ammonia in the Delta has been the subject of two recent, summary papers, copies of which are attached hereto as Exhibit E.[3]

At present, the Tentative Discharge Requirements do not indicate what – if any – contemporaneous scientific materials the Central Valley Regional Board consulted and considered to arrive at its decision regarding the ammonia limitation (or any other effluent limitation for that fact). The lack of explanation or change to the Tentative Discharge Requirements from what existed in the prior NPDES permit held by the City strongly suggest that no new information was relied upon or considered. It also appears that the Tentative Discharge Requirements fail to account for the ongoing violations by the City. For these reasons, and contrary to the Tentative Discharge Requirements, the evidence reflects a need for the Central Valley Regional Board to conduct an independent analysis which will support a finding that the Tentative Discharge Requirements and effluent limitations provided therein will protect the beneficial uses of the receiving waters.

Need For More Rigorous Monitoring

The Tentative Discharge Requirements lack the level of rigor required for monitoring. The SWRCB and the Central Valley Regional Board recognized in the Bay

[3] The two papers were found on the Central Valley Regional Board's website at: waterboards.ca.gov/centralvalley/water_issues/delta_water_quality/ammonia_issues/ammonia_issues_11jun08.pdf, and waterboards.ca.gov/centralvalley/water_issues/delta_water_quality/ammonia_issues/delta_smelt_update_30jul08.pdf

Delta Strategic Workplan the importance of increased monitoring for contaminants. The Bay Delta Strategic Workplan provides:

> The pelagic organism decline in the Delta and subsequent increased focus on contaminants as a potential cause highlight the need for regularly compiling, assessing, and reporting data that is currently being collected and the need to better coordinate monitoring efforts.

(Bay Delta Strategic Workplan, p. 59.) The renewal of the City's NPDES permit provides an opportunity to effectuate better monitoring of contaminants.

More specifically, the SWRCB and Central Valley Regional Board noted that there "are a suite of contaminants and source categories that pose a concern for some Delta beneficial uses and there is also concern for an emerging list of new contaminant categories (pharmaceuticals and endocrine disrupters)." (Bay Delta Strategic Workplan, p. 25.) Recent investigations claim to have discovered detectable levels of pharmaceuticals in drinking water supplies across the country. ("Prescription Drugs Found in Drinking Water Across U.S." Associated Press, March 10, 2008; "AP Enterprise: Drugs Affect More Drinking Water," Associated Press, September 11, 2008; "AP Enterprise: Report Prompts More Testing," Associated Press, September 11, 2008.) The investigations assert medication not absorbed by its taker "passes through the [body] and is flushed down the toilet," and that even though the wastewater is treated "most treatments do not remove all drug residue." Thus, according to the investigations, prescription drugs can enter water supplies through municipal wastewater discharges.

It is presently unclear whether NPDES permits, like the one the City seeks, should include discharge requirements that specifically address pharmaceuticals. However, emerging science indicates that "persistent exposure to random combinations of low levels of pharmaceuticals . . . [indicate] alarming effects on human cells and wildlife." ("Prescription Drugs Found in Drinking Water Across U.S." Associated Press, March 10, 2008.) Therefore, at a minimum, the City should be required to monitor the pharmaceutical constituents in its waste discharges.

Conclusion

For the reasons set forth above, the Authority and Westlands respectively request that the Central Valley Regional Board not adopt the Tentative Discharge Requirements. The Authority and Westlands remain concerned that the Tentative Discharge Requirements are not protective of beneficial uses. They do not appear consistent with the Bay Delta Plan and the Basin Plan, and they do not appear to reflect important, emerging science.

Further, the changed circumstances in the Delta, the existence of the ongoing violations by the City, and the emergence of new studies and information on the effects of contaminants in wastewater warrant a renewal NPDES permit that has a term shorter then 5 years, as currently proposed, with provisions that allow for opening of the permit as new information develops, and more thorough analyses of what effluent limitations will protect beneficial uses, analyses based on contemporaneous scientific information.

Finally, the NPDES permit ultimately issued by the Central Valley Regional Board must include increased monitoring by the City.

Thank you very much for your consideration of these comments.

Very truly yours,

DIEPENBROCK HARRISON
A Professional Corporation

Jon D. Rubin
Attorneys for San Luis & Delta-Mendota Water Authority and Westlands Water District

cc: Daniel Nelson, SLDMWA
Thomas Birmingham, WWD

Exhibit B

10/8/08 Public Workshop
Bay Delta Periodic Review
Deadline: 10/1/08 by 12 noon

CVCWA
Central Valley Clean Water Association

Representing Over Sixty Wastewater Agencies

September 30, 2008

Via electronic mail and U.S. Postal Mail

RECEIVED
SEP 30 2008
SWRCB EXECUTIVE

Ms. Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-2000
commentletters@waterboards.ca.gov

SUBJECT: **Triennial Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary**

Dear Ms. Townsend:

The Central Valley Clean Water Association (CVCWA) appreciates the opportunity to provide comments to the State Water Resources Control Board (State Water Board) regarding its periodic review of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (2006 Bay-Delta Plan). CVCWA represents the interests of more than 60 wastewater agencies in the Central Valley in regulatory matters related to water quality and the environment. Included in the membership are a number of wastewater agencies that may be directly or indirectly affected by future regulatory and policy actions in the Delta.

First, CVCWA is concerned with the application of certain water quality objectives that are part of the 2006 Bay-Delta Plan. In particular, CVCWA is concerned with the application of salinity objectives to municipal wastewater discharges without proper consideration and implementation of Water Code sections 13000 and 13241.

Water Code section 13000 requires the State Water Board to regulate activities "to attain the highest water quality which is reasonable, considering all demands made and to be made ... ." (Wat. Code, § 13000.) This legal standard is of general applicability and applies to all of the State Water Board's water quality regulatory activities, including the development and adoption of water quality control plans (i.e., basin plans). When adopting water quality objectives, Water Code section 13241, as applied to the State Water Board by Water Code section 13170, requires the State Water Board to consider a number of statutory factors. The factors for consideration include: beneficial uses, water quality conditions that could be

reasonably achieved, economic considerations, the need to develop housing, and the need to develop and use recycled water. (Wat. Code, § 13241.)

When the salinity objectives were adopted as part of the Bay-Delta Plan, the State Water Board focused on export pumping operations by the Department of Water Resources and the Bureau of Reclamation as the primary means for compliance with the objectives. (See In the Matter of the Petition of City of Manteca, Order WQ 2005-0005, at pp. 6-11.) The State Water Board did not evaluate or consider municipal wastewater discharge limitations as part of the State's implementation program for complying with the objectives. (*Id.*) Thus, the State Water Board failed to consider the implications of compliance on municipal wastewater agencies, including potential costs.

In 2006, the State Water Board amended the Bay-Delta Plan to expand application of the salinity water quality objectives from specific compliance locations to locations in "that general area," and amended the implementation program to require the Central Valley Regional Water Board to "impose discharge controls on in-Delta discharges of salts by agricultural, domestic, and municipal dischargers." (2006 Bay-Delta Plan at pp. 10, 28.) However, the administrative record for the 2006 Bay-Delta Plan fails to indicate that the State Water Board considered the statutorily required factors when it expanded the geographic area of application, and more importantly, when it expanded application of objectives on municipal dischargers.

Thus, the 2006 Bay-Delta Plan and the salinity objectives contained therein are not appropriate as applied to municipal dischargers, and must be reviewed and revised accordingly within this triennial review process. (See *Cities of Arcadia, et al. v. State Water Resources Control Board*, Super. Ct. Orange County, 2008, No. 06CC02974, Preemptory Writ of Mandate, Superior Court found it necessary for water quality standards to be reviewed in light of the factors and requirements set forth under Water Code sections 13241 and 13000 where such standards had not previously been considered as applied to stormwater.)

Second, CVCWA understands that other interested parties may recommend that the 2006 Bay-Delta Plan be amended to include water quality objectives for constituents of concern to drinking water. To the extent this may occur, CVCWA encourages the State Water Board to defer to the Drinking Water Policy development process that is underway with the Central Valley Regional Water Board. Through the Central Valley Drinking Water Policy Workgroup, the Central Valley Regional Water Board and other interested stakeholders have worked collaboratively for many years to develop and evaluate information and data on drinking water constituents of high priority. Based on the information developed, the Central Valley Regional Water Board will consider amending its Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, as necessary. It is unnecessary and inappropriate for the State Water Board to preempt this process.

In summary, the State Water Board must evaluate the application of salinity water quality objectives to municipal discharges in accordance and in consideration of Water Code sections 13000 and 13241. Also, to the extent others may recommend amendments to address drinking water quality constituents, such suggestions should not be adopted due to the Central Valley Regional Water Board's mature process directed toward developing a Drinking Water Policy.

Sincerely,

Original signed by Debbie Webster

Debbie Webster, Executive Officer
Central Valley Clean Water Association

c: Pamela Creedon, Central Valley RWQCB

10/8/08 Public Workshop
Bay Delta Periodic Review
Deadline: 10/1/08 by 12 noon

Central Valley Clean Water Association

Representing Over Sixty Wastewater Agencies

September 30, 2008

Via electronic mail and U.S. Postal Mail

Ms. Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-2000
commentletters@waterboards.ca.gov

SUBJECT: **Triennial Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary**

Dear Ms. Townsend:

The Central Valley Clean Water Association (CVCWA) appreciates the opportunity to provide comments to the State Water Resources Control Board (State Water Board) regarding its periodic review of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (2006 Bay-Delta Plan). CVCWA represents the interests of more than 60 wastewater agencies in the Central Valley in regulatory matters related to water quality and the environment. Included in the membership are a number of wastewater agencies that may be directly or indirectly affected by future regulatory and policy actions in the Delta.

First, CVCWA is concerned with the application of certain water quality objectives that are part of the 2006 Bay-Delta Plan. In particular, CVCWA is concerned with the application of salinity objectives to municipal wastewater discharges without proper consideration and implementation of Water Code sections 13000 and 13241.

Water Code section 13000 requires the State Water Board to regulate activities "to attain the highest water quality which is reasonable, considering all demands made and to be made ... ." (Wat. Code, § 13000.) This legal standard is of general applicability and applies to all of the State Water Board's water quality regulatory activities, including the development and adoption of water quality control plans (i.e., basin plans). When adopting water quality objectives, Water Code section 13241, as applied to the State Water Board by Water Code section 13170, requires the State Water Board to consider a number of statutory factors. The factors for consideration include: beneficial uses, water quality conditions that could be

reasonably achieved, economic considerations, the need to develop housing, and the need to develop and use recycled water. (Wat. Code, § 13241.)

When the salinity objectives were adopted as part of the Bay-Delta Plan, the State Water Board focused on export pumping operations by the Department of Water Resources and the Bureau of Reclamation as the primary means for compliance with the objectives. (See In the Matter of the Petition of City of Manteca, Order WQ 2005-0005, at pp. 6-11.) The State Water Board did not evaluate or consider municipal wastewater discharge limitations as part of the State's implementation program for complying with the objectives. (*Id.*) Thus, the State Water Board failed to consider the implications of compliance on municipal wastewater agencies, including potential costs.

In 2006, the State Water Board amended the Bay-Delta Plan to expand application of the salinity water quality objectives from specific compliance locations to locations in "that general area," and amended the implementation program to require the Central Valley Regional Water Board to "impose discharge controls on in-Delta discharges of salts by agricultural, domestic, and municipal dischargers." (2006 Bay-Delta Plan at pp. 10, 28.) However, the administrative record for the 2006 Bay-Delta Plan fails to indicate that the State Water Board considered the statutorily required factors when it expanded the geographic area of application, and more importantly, when it expanded application of objectives on municipal dischargers.

Thus, the 2006 Bay-Delta Plan and the salinity objectives contained therein are not appropriate as applied to municipal dischargers, and must be reviewed and revised accordingly within this triennial review process. (See *Cities of Arcadia, et al. v. State Water Resources Control Board*, Super. Ct. Orange County, 2008, No. 06CC02974, Preemptory Writ of Mandate, Superior Court found it necessary for water quality standards to be reviewed in light of the factors and requirements set forth under Water Code sections 13241 and 13000 where such standards had not previously been considered as applied to stormwater.)

Second, CVCWA understands that other interested parties may recommend that the 2006 Bay-Delta Plan be amended to include water quality objectives for constituents of concern to drinking water. To the extent this may occur, CVCWA encourages the State Water Board to defer to the Drinking Water Policy development process that is underway with the Central Valley Regional Water Board. Through the Central Valley Drinking Water Policy Workgroup, the Central Valley Regional Water Board and other interested stakeholders have worked collaboratively for many years to develop and evaluate information and data on drinking water constituents of high priority. Based on the information developed, the Central Valley Regional Water Board will consider amending its Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, as necessary. It is unnecessary and inappropriate for the State Water Board to preempt this process.

In summary, the State Water Board must evaluate the application of salinity water quality objectives to municipal discharges in accordance and in consideration of Water Code sections 13000 and 13241. Also, to the extent others may recommend amendments to address drinking water quality constituents, such suggestions should not be adopted due to the Central Valley Regional Water Board's mature process directed toward developing a Drinking Water Policy.

Sincerely,

Original signed by Debbie Webster

Debbie Webster, Executive Officer
Central Valley Clean Water Association

c: Pamela Creedon, Central Valley RWQCB

Concerns about Ammonia Concentrations in Delta Waters

A June 2nd article in the Sacramento Bee highlighted some recent findings by Dr. Richard Dugdale, a researcher at San Francisco State University, which suggested that ammonia levels in the Delta and Sacramento River may pose a threat to Delta species by interrupting the food chain. The Regional Water Board and others agree that it is essential to initiate actions to follow-up on these preliminary results. Following is some background information and a brief description of the follow-up activities underway on this particular issue and some related issues.

Algal Production

Primary production rates and standing chlorophyll levels in the Sacramento-San Joaquin Delta Estuary are among the lowest of all the major estuaries in the world and continue to decline. The reason(s) are unclear but decreasing primary production is cited as a possible cause of the decline of important Delta fish species, such as Delta smelt. Recent work by Drs. Dugdale and Wilkerson, San Francisco State University Romberg Tiburon Center, has shown that elevated ammonium concentrations reduce diatom (a type of algae that is important in the Bay and Delta) production rates in water samples collected from San Francisco and Suisun Bays by inhibiting nitrate uptake. It is not known whether the same effect is manifested in the Delta.

Also, it is not known whether the ammonium concentrations in the River inhibit freshwater diatom production and are a cause of low algal primary production in the freshwater portions of the Delta. The Regional Water Board contracted with Dr. Dugdale to conduct experiments with diatoms collected from the lower Sacramento River to determine whether ambient in-stream ammonium concentrations reduce growth rates. Staff will be evaluating existing information to determine the need for studies to determine fate and transport of ammonium down the Sacramento River and across the Delta to determine what factors contribute to ammonium concentrations in Suisun Bay.

Once the results of the follow-up screening studies are complete, further work will be needed to determine the relative importance of ammonium on the Delta food web.

Delta Smelt Survival

In most water years, larval Delta smelt are caught in the spring about 30 miles below the City of Sacramento at the confluence of the Sacramento River and Sacramento Deepwater Ship Channel. Recent data from bioassay tests with ambient Sacramento River water has led to the hypothesis that larval Delta smelt may be sensitive to ammonia.

The Regional Water Board has contracted with researchers at the University of California, Davis to conduct bioassays with larval Delta smelt to determine their

sensitivity to ammonia in the lower Sacramento River and to identify whether other toxicants might be present. These studies were initiated in May 2008. Further study will be needed to determine if any additional actions should be taken to control ammonia discharges to protect Delta smelt.

Stimulation of Nuisance Algal Blooms

Recent research conducted by the Department of Water Resources (DWR) suggests that nuisance algal blooms that have been occurring in the Delta in recent years might be linked to elevated levels of ammonia in Delta waters. The nuisance blooms are characterized by surface scums and the release of toxins into the water. Regional Water Board staff is coordinating with DWR on follow-up studies.

Wastewater Treatment Plant Discharges

A recent review of ammonia concentrations in the Delta has shown that ammonia levels in the Sacramento River at Greene Landing are about an order of magnitude higher than concentrations reducing diatom growth in half in San Francisco Bay. And, as was discussed above, there are concerns about potential toxic impacts to Delta smelt and stimulation of nuisance algal blooms.

As was mentioned in the article, the Sacramento Regional County Sanitation District (SRCSD) discharge is the largest single source of ammonia in the Delta. Other sources include other smaller wastewater treatment plants and agricultural discharges. The Regional Water Board's current wastewater discharge permit requirements for ammonia are based on US EPA guidance on aquatic toxicity that is designed to protect the most sensitive aquatic species. When writing a permit, Regional Water Board staff evaluates effluent concentrations, concentrations of ammonia already in the river and available dilution. Limitations in permits are, therefore, site specific. SRCSD's permit allows for discharge of relatively high concentrations of ammonia because the river is large and provides considerable dilution. SRCSD has constructed large storage basins to hold wastewater when there is not sufficient dilution in the river. The City of Stockton, on the other hand, has very stringent effluent ammonia limits because little dilution is available. Several years ago the Regional Water Board required Stockton to upgrade their wastewater treatment facility to add treatment processes to remove ammonia.

It is important to recognize that current Delta ammonia concentrations are far lower than concentrations that US EPA guidance indicates would be toxic. The current studies and follow-up studies may provide information that would lead to the need for stricter requirements on all sources of ammonia to the Delta.

Be assured that the Water Quality Control Board is committed to protecting the waters of our state. In this effort we are engaged with the scientific community to study and document impacts to water quality. When new scientific information is developed we incorporate this information into our permits.

Study to Evaluate Potential Effects of Ammonia on Delta Smelt

Status Update – 30 July 2008

A previous web posting[1] summarized background information about issues related to ammonia in the Sacramento-San Joaquin Delta estuary. As indicated in that posting, the Regional Water Board contracted with researchers at the University of California, Davis Aquatic Toxicology Laboratory to initiate studies to evaluate the potential effects of ammonia on delta smelt. The study was designed to answer two questions:

1. Is delta smelt survival negatively impacted by ambient ammonia concentrations in the Sacramento River with increasing concentrations causing increased mortality?
2. Is delta smelt survival negatively impacted by one or more contaminants present in the Sacramento Regional Wastewater Treatment Plant (SRWTP) effluent that are positively correlated with ammonia?

The study plan identified two sets of experiments to be conducted with the first set beginning in June 2008. To date, researchers have conducted two tests: one to determine the 4-day delta smelt ammonia LC50 in laboratory water (i.e., establish the concentration of ammonia that would cause 50% of the test fish to die) and the first set of ambient tests using the SRWTP effluent as a source of ammonia. In the LC50 test the concentration of total ammonia at which no effect could be detected was 5 mg/L, the lowest concentration that produced an effect was 9 mg/L, and the LC50 was calculated at 12 mg/L. These results suggest that delta smelt are about as sensitive to ammonia as some of the more sensitive species (e.g., salmon and trout) and therefore, that the USEPA acute ammonia criteria used by the Regional Board in NPDES permitting would be protective of delta smelt. Average ammonia concentrations in the Sacramento River also are lower than the chronic effect levels for fish species reported in the USEPA dataset.

The ambient set of tests were conducted in Sacramento River water collected upstream of the SRWTP discharge at concentrations of ammonia that encompassed average concentrations in the River once the effluent is fully mixed downstream. To evaluate whether any other toxicants could be present in the SRWTP effluent that effect delta smelt (question #2), the tests were conducted using laboratory ammonium chloride (ranging from 0.25 to 4.0 mg/L) and SRWTP effluent (ranging from 0.25 to 2.0 mg/L) as a source of ammonia. No effect was observed at any of the ammonia concentrations. These results are consistent with the laboratory LC50 study and indicate that the SRWTP effluent is not acutely toxic to Delta smelt at concentrations four times greater than the average currently observed in the Sacramento River, and five times greater than the average effluent concentration now present in the Sacramento River.

[1]The referenced document is available for download at:
http://www.waterboards.ca.gov/centralvalley/water_issues/delta_water_quality/ammonia_issues/ammonia_issues_11jun08.pdf

After reviewing the initial results, Regional Water Board staff, in consultation with UC Davis researchers, SRWTP, and the review team[2], planned modifications to the study design to further evaluate question #2. - The new objective is to quantify the potential interactions between effluent and ammonia toxicity to delta smelt (i.e., does the effluent add to, decrease, or have no effect on toxicity). The second set of tests will include some of the same concentrations of ammonia that were tested previously to verify the results of the first set of tests. In addition, higher concentrations, closer to the level that produced effects in the LC50 study, will be tested to evaluate question #2 and to assess the potential for effluent and ammonia interactions. It should be noted that these concentrations are well above levels that occur in the Sacramento River downstream of the SRWTP discharge. This second set of tests will be conducted in July 2008.

It is important to note that these studies only assess the acute (i.e., short-term, lethal) effects of ammonia on delta smelt immediately downstream of the SRWTP discharge location in the Sacramento River. Questions remain about the potential for chronic (i.e., long-term, sub-lethal) impacts from ammonia as well as the impacts in sensitive delta smelt spawning areas downstream of the SRWTP discharge. Future studies may need to be designed to answer these questions.

[2] The Interagency Ecological Program Contaminants Work Team served as the technical review panel for these studies.